DOCUMENT RESUME

ED 077 238 EM 011 161

AUTHOR	McAdam, J. Robert; Vento, Charles J.
TITLE	Portable Video Tape Recorder. A Guide for Teachers.
INSTITUTION	National Education Association, Washington, D.C. Educational Technology Div.
PUB DATE	69
NOTE	57p.
AVAILABLE FROM	Publication Sales Section, National Education Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036 (Stock No. 071-02514, $2.00)
EDRS PRICE	MF-$0.65 HC Not Available from EDRS.
DESCRIPTORS	*Educational Technology; Guides; *Instructional Innovation; *Instructional Media; Media Selection; Technological Advancement; Television; *Video Equipment; *Video Tape Recordings

ABSTRACT

Portable video tape recorders (PVTR) provide teachers and students with opportunities for less expensive experimentation in using television as a teaching tool. This guide suggests ways of utilizing PVTR, gives examples, describes the operation of the equipment, and reviews differences in the equipment available. (RH)

ED 077238

EM

PVTR

PORTABLE VIDEO TAPE RECORDER

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL BY MICROFICHE ONLY HAS BEEN GRANTED BY

NEA

TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER."

A GUIDE FOR TEACHERS

McADAM AND VENTO

EM 011 161

Single copy, $2.00 (Stock No. 071-02514). Discounts on quantity orders: 2-9 copies, 10 percent; 10 or more copies, 20 percent. Orders accompanied by payment will be sent postpaid. Shipping and handling charges will be added to billed orders. All orders of $2 or less must be accompanied by payment. Order from Publications – Sales Section, National Education Association, 1201 Sixteenth Street, N.W., Washington, D.C. 20036.

PRINTED IN U.S.A.

ED 077238

PORTABLE VIDEO TAPE RECORDER

A Guide For Teachers

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Authors

J. Robert McAdam
Sacramento State College

Charles J. Venio
Valley Instructional Television Association

Photography

Ralph E. Talbert
Sacramento State College

DIVISION OF EDUCATIONAL TECHNOLOGY
NATIONAL EDUCATION ASSOCIATION

ACKNOWLEDGMENTS

Sincere appreciation is expressed to many individuals for their assistance in the development of this publication.

Gertrude Schwartz, Will C. Wood Junior High School – Sacramento City Unified School District

Kenneth Blue, Helen Duvall, Anita Fraser, Donald Klopp, Thomas Nicol, Joan Sutcliffe, William Van Dyke, Roger Walters, Forrest Widdifield – Sacramento State College

Dean Dayton, Rio Americano High School – San Juan Unified School District

C. Louis Nevins, Marjorie Prentice, Consultants – Valley Instructional Television Association

CONTENTS

Foreword iv
Introduction 1
Utilization of PVTR 3
Setting Up 15
Selecting and Evaluating PVTR's 38
Future Possibilities 41
PVTR Evaluation Checklist 51
Glossary 53
Cue Guide 56
Bibliography 57

FOREWORD

The teacher with his students are the major ingredients in relevant planning, production, and effective use of portable television systems. Utilization of portable television will expand the potential resources of the imaginative teacher to the point of being a catalyst for many new learning experiences. This guide was designed with the novice as well as the experienced teacher in mind. Basic techniques with classroom applications are included. The portable video tape recorder has the ability of providing televised material with a degree of flexibility heretofore unavailable in the television medium. It holds promise as one of the most exciting and popular reasons for television in the classroom. The teacher will discover its unique potential, through continual use, as a tool for individualized and small group learning.

The Division of Educational Technology of the NEA and the Valley Instructional Television Association of California are pleased to sponsor the publication of this teacher's guide to the use of the portable video tape recorder. The design and sophistication of television equipment is continually and rapidly changing, therefore the effort of the authors was to minimize specific models and manufacturers. Because of the concern for changes in equipment, general data is provided with the intent to stimulate recognition and use of the portable video tape recorder.

INTRODUCTION

The portable video tape recorder (PVTR) is assuming major proportions in its application in school-classroom instructional practice. Through its advantageous employment, it is proving to be an excellent tool of instruction. School personnel are investing increased attention to the new developments of low cost PVTR. Because PVTR's are smaller, less expensive, and portable (in varying degrees), teachers and administrators are expanding the utilization of PVTR's mainly in two functions (1) as a central closed circuit distribution system in the school and (2) as miniature closed circuit systems in the classrooms.

The comparative ease of operation and utilization of videotape equipment with its exceptional flexibility offers educators the only means of local production and immediate access – "instant replay" – to instructional materials. PVTR allows for a method of "canning" instructional experiences for storage and future utilization. It also provides for a less costly process of using software. Videotape may be erased and reused. This is a major advantage of tape over the more costly, less flexible film media. PVTR utilization provides "instant replay" capability which allows the producer to evaluate what was taped. If the material does not satisfy the need, it is possible to re-shoot the scene before it is lost.

PVTR equipment developments are:

1. *Making low-cost units possible*
2. *Reducing operational complexities*
3. *Reducing maintenance problems*
4. *Providing economic access to instructional materials*
5. *Providing access to audio and visual images for self evaluation*
6. *Making transportability possible*
7. *Eliminating need for complex production know-how*
8. *Eliminating expensive production systems*
9. *Providing for both color and black and white*
10. *Providing for good quality reproduction*
11. *Eliminating the need for professional technicians as operators*

PVTR equipment does not:

1. *Provide for open circuit type broadcast compability*
2. *Provide all the answers to educational problems*
3. *Meet FCC standards for broadcast performance*
4. *Replace studio-broadcast production systems*
5. *Provide for interchangeability between manufacturers.*
6. *In itself, provide effective instructional applicability*

Although the PVTR is demonstrating its value as an instructional tool, teachers and administrators are cautioned to assess their needs and to define specific objectives for the introduction and use of the PVTR before purchasing. Established goals at the onset of planning will eliminate negative evaluations and provide additional exciting instructional application as experience increases. Since boards of education do not want their equipment collecting dust in school closets, prior planning will help to assure pertinent utilization. Therefore, this guide was produced with the purpose of providing teachers a simplified approach to the utilization of PVTR's.

A Versatile Medium

Many instructional or training activities will receive a boost from portable television. Demonstrations that have objects too small to be seen by all members of a class may be enlarged with video equipment. Experiments that are very involved or run too long in development may be rendered more useable. Microscopic life can be magnified and taped for use at any appropriate later occasion. Observation of animal behavior in a zoo or elsewhere can be documented. Field trips to museums and galleries can be visually recorded – anything anywhere that can be seen in normal indoor or outdoor light can be taped easily for later playback.

A variety of locally selected on-the-job situations may be illustrated to improve a trainee's performance. Important personalities may be interviewed and brought into the instructional situation by video tape.

Self-evaluation can be undertaken more effectively in speaking, acting, teaching, interviewing, or performing physical feats. Rehearsal activity will be made more enjoyable and far more productive. Teachers will find that watching themselves on tape will reveal many a surprising mannerism or instructional characteristic.

In summary, a video recording can be made almost anywhere (and enlarged, reduced, or condensed) for playback at appropriate times and places, self-evaluation can be made more efficient, and rehearsal activity can be made more productive. The versatility of portable television equipment enhances all of these efforts.

UTILIZATION OF PORTABLE VIDEO TAPE RECORDERS

The portable video tape recorder (PVTR) with its camera, monitor, and accessories promises to surpass traditional audio visual tools in instructional communication. The advantages found in several older visual and sound devices are incorporated into one small assembly of equipment. Nontechnical personnel with very little instruction may record and playback both visual and audio material.

The Teacher Returns To Center Stage

The teacher's instructional potential is greatly enhanced with portable television equipment. Only the imagination sets limits to creative utilization of the PVTR. Local video production by the classroom teacher may meet the teacher's needs when commercially available films, filmstrips, slides, tapes, and disks cannot. Furthermore, a certain "live" quality not found in the traditional media will be added to the instruction.

With the teacher in the role of local producer there will be a welcome return of teacher initiative and control of the instructional situation all too often non-existent in commercially produced material.

Fig. 1. The camera enlarges hard-to-see techniques in papier mache construction.

Typical Videotaping Situations

Mr. Merrill found that he could convey papier mache techniques to his class much better over television. Close-up lenses permitted views of his method in assembling wire or wood skeletal structures as well as the mixing and moulding of the papier mache. He could also eliminate the waiting time by taping the drying product at various stages.

Mr. Butz took his battery-operated camera and shoulder-pack PVTR one Saturday into the slum areas of a large city. He taped street scenes, living quarters, children at play, and loitering areas. In his class dealing with American Problems he played back the tape without even bothering to edit. The suburban students got a closer look at an almost unbelievable way of life. The proxy experience was made a little more personal to them because of their teacher's involvement. Later, Mr. Butz added a running narration onto the tape.

Mr. Crawford required all of his students to rehearse at least one speech assignment in front of the PVTR system. Replays helped reduce distracting mannerisms, monotone deliveries, and did much to encourage better speech organization.

Fig. 2. The swimming coach discusses the plane of the body during the racing dive.

Mr. Talbert found that his swimming students took to heart more readily his criticisms on diving, stroke, and style when they saw themselves performing on the replay.

Mrs. Duval gave a close-up side view of her typing demonstrations so that the students could watch her fingers at work. Students watched themselves on frequent playbacks improving and shedding bad habits.

Mr. Walters had formerly documented his students' progress in speech therapy with audio tape recordings. He now takes periodic video recordings of a child and replays all of the recordings of one child's speech improvement in one continuous sequence for parents to witness. Incidentally, he uses a number of these recordings for inservice training sessions with other therapists.

Mr. Van Dyke is principal of a junior high school. A radically new program of science instruction initiated by his teachers raised quite a few eyebrows in the community. He had several portions of this new instructional approach videotaped for replay to parents and to the school board. More fully informed, the parents exhibited greater enthusiasm for the program.

Fig. 3. A close-up view of the typist's fingers at work.

Fig. 4. Parents watch the playback of periodic recordings showing the gradual improvement of their son's speech habits.

Fig. 5. The lens of the camera can be removed and the eyepiece of the microscope brought close to the face of the vidicon tube in the camera.

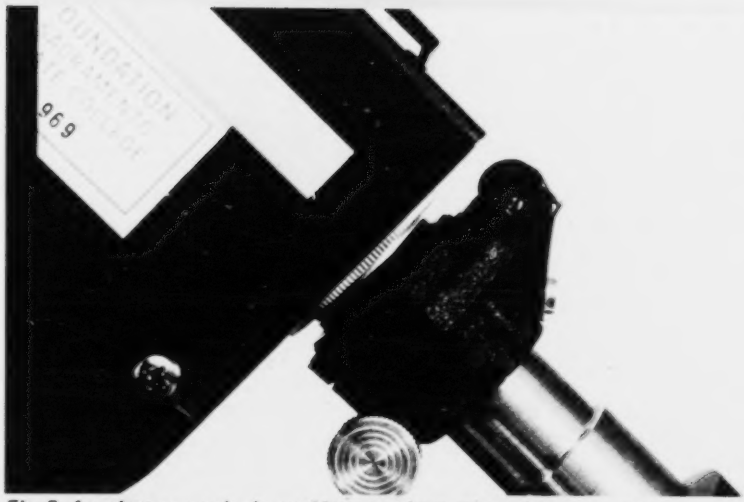


Fig. 6. An adapter may also be used between the eyepiece of the microscope and the camera. More constant optical alignment is achieved, and unwanted light kept out.

Fig. 7. Cross-section of part of a cucumber seed enlarged for all the class to see.

Mr. Jillson wanted his elementary class members to see microscopic animals from pond water, cross-sections of plant stems, and even cross-sections of seeds. Motion pictures were available on these topics but were not quite suited to his instructional approach. He removed the lens from the television camera and carefully positioned the camera above the eyepiece of the microscope. After mounting the appropriate slides on the microscope he pointed out to the class those characteristics of plant and animal life that all class members could see at the same time. Another teacher enlarged a wasp's nest for close examination.

Fig. 9. Mr. Blue quizzes students in driver training in "what would you do?" situations. The situations were taped locally in familiar settings.

Fig. 8. Most children will readily recognize the familiar wasp's nest enlarged for discussion purposes.

Fig. 10. Local landmarks are taped with portable camera and PVTR while the class makes the tour. Later review in class is enlightened by the video tape replay.

Mr. Fallon is a training manager for a sales organization. He has novice salesmen demonstrate their sales techniques which are taped and replayed for discussion. Many of the salesmen sharpened their techniques when they saw themselves "as others see them."

Mr. Blue has taped for replay many traffic situations typically covered in classroom discussion and experienced on the road. The students got a better idea of the points that were stressed.

Mrs. Sutcliffe, a first year teacher, found many a presentation technique that needed polishing in her early coverage of fractions.

Fig. 11. The elementary math and science supervisor assists Mrs. Sutcliffe in developing more lucid explanations of fractions.

Fig. 12. Children participate in puppet story telling.

Mrs. Klopp took the school district's battery-operated shoulder-pack PVTR and camera and taped important local landmarks during her class' tour of those locations. Later this video tape served well in a serious treatment of local history. The students were highly motivated as they saw themselves moving about the historic locations. 2 x 2 slides would have documented the places, but they would not have included the motivational element sometimes lacking in instruction.

Mrs. Frazer ingeneously put together a puppet show with a background of second grade children's art. The entire classroom was involved in the production.

Fig. 13. Mrs. Frazer works in backgrounds done by her second graders.

POTENTIAL USES OF THE PVTR

The principal theme of this book is to improve instruction. Which situations call for use of the PVTR is a decision that rests with the instructor. A few guidelines in deciding what merits taping rather than using some other means of illustration may be helpful.

SITUATION	PVTR's CONTRIBUTION
1. Demonstration involved a great deal of equipment, detail work, and time when it is performed.	Saves time by taping it once for all future use.
2. Action is too long in development.	Condenses time by taking scenes at appropriate intervals and palying back all together.
3. Rehearsal situation requires recording and immediate playback.	Made to order for just this circumstance.
4. Event takes places in a location not accessible to the student or class.	Brings the event into the classroom having used portable camera and shoulder-pack PVTR
5. Objects are too small for class to see.	Magnifies objects using close-up lenses or microscope.
6. Local visual objects or places are separated by some distance.	Brings related visuals together onto the same tape.
7. Situation requires alternate views, fairly close-up as well as distant views immediately.	Uses zoom lens as in regular photography.
8. Objects can only be photographed in available light – i.e., classroom or daylight.	Handles easily.
9. Needs to be shown repeatedly during same class period.	Play and rewind rapidly without additional threading.
10. School budget does not allow many supplies.	Videotape is erasable and reusable indefinitely.
11. Would like to present visual in a fully lighted classroom.	TV images are visible in any light, as are your home TV programs.
12. Teacher wants to photograph or record scenes personally, but has no technical training.	Little training necessary.
13. A demonstration must be seen by all students at the same time.	Without crowding, all students may follow the point of instruction as it appears on the TV screen.

THOSE OTHER EXTRAS

Inexpensive equipment cannot compete with studio equipment or commercial channel television equipment. Some features such as still picture or slow motion are not easily obtainable on portable equipment. Still pictures are available on inexpensive equipment, but the image is not always clear and sometimes vibrates in annoying fashion. Slow motion playback is not available yet on portable equipment. Color equipment costs very much more than monochrome equipment. At this writing the most reasonable price for a color PVTR alone approximates $4000. Color cameras for portable equipment run three times that much. An additional audio track for narration over original sound may be added to the videotape with the more expensive models.

A Word Of Encouragement

In this chapter we have attempted to give only a few pointers and typical circumstances in which PVTR utilization would be advantageous. Teacher imagination and exploration will carry specific application of this new tool to classroom situations. We encourage teachers and other users to be concerned with reaching instructional objectives more effectively with the PVTR. To do otherwise would imply mere gadgetry – an overemphasis on hardware.

SETTING UP

Instructors have waited some time for a camera that would record movement, enlarge small objects, and play back instantly anything that is photographed. They wanted for motion what polaroid gave to still photography. They wanted also a device that required little photographic or technical know-how. Portable television satisfies these yearnings.

Availability of Low Cost Television Equipment

Domestic and foreign television manufacturers have put on the market recently portable closed circuit telvision equipment of such low cost that it is now within reach of business, school, and church budgets. A complete monochrome (black & white) system consisting of a camera, video tape recorder, and monitor is available for as low as $1500 – the cost of three motion picture projectors. The quality is good for local use, and the equipment is rugged enough for portable situations. Higher quality portable monochrome systems with greater flexibility and accessories may run as high as $6000. If color is desired the purchaser must be prepared to pay much more, although less expensive portable color television is being developed.

Most of the larger electronic firms market both the low cost and the more expensive portable systems. The low cost systems use half-inch videotape width, the medium and higher priced systems use one-inch videotape.

There is still some pioneering work being done on quarter-inch portable television. Standard audio tape only is required. If the quarter-inch system proves feasible, it will reduce costs of portable equipment measurably.

Ease of Operation

Portable television equipment is easy to thread and operate. Some feel that it is easier to handle than a motion picture projector. After connecting the camera and the receiver to the PVTR there are usually two or three simple buttons or switches necessary to activate the whole system. Minor sound and picture adjustments may be called for after operation begins, but they resemble those adjustments made on most home television receivers – brightness, contrast, and focus.

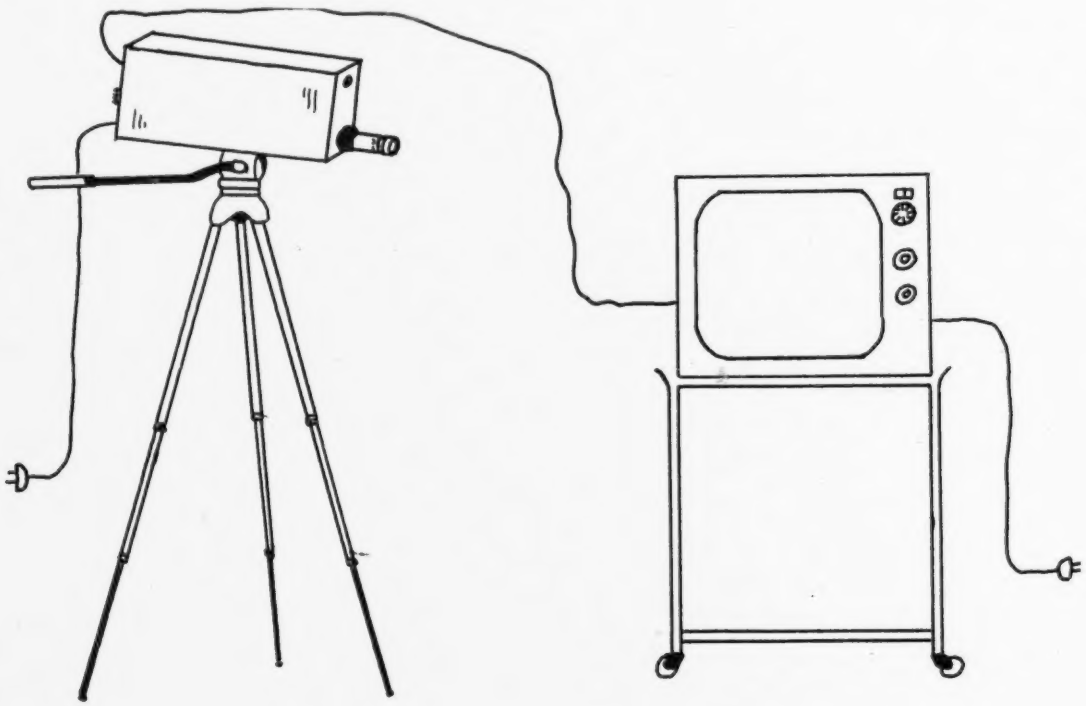


Figure 14. The simplest portable system, used primarily for image magnification.

Assembling A Simple System

Consider first the pieces of equipment and cables that comprise simple portable systems. Here is a typical layout that uses only a camera and a receiver. No recording and playback device is involved. Note that each piece of equipment plugs into a wall outlet and that the camera connects to the receiver.

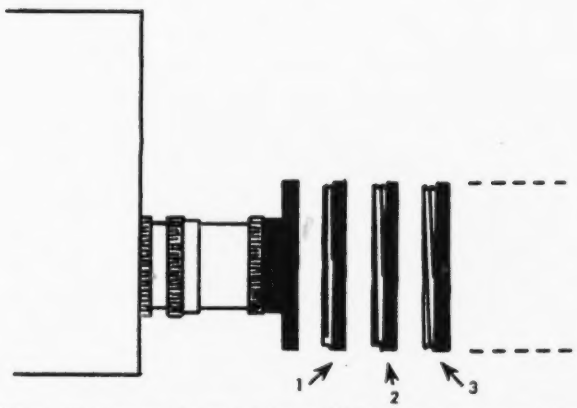


Figure 15. Close-up lenses can be used individually or in combination. Some camera lenses require an adapter before the close-up lens may be attached.

Under desired conditions any television would connect with any receiver set in this simple system. Such a convenience is not always the case, however. Television equipment dealers will explain the problem of incompatibility between products of different manufacture. If this simple camera-receiver system is all that an instructor needs, it is advisable to buy both items from the same manufacturer. Also, the camera must contain an "RF generator" to do the job.

Frequently an additional, smaller receiver may be desirable so that the instructor will not have to look at the classroom receiver to see what he is showing. The instructor's receiver is called a monitor. A microphone for sound amplification can be included with the system as an additional feature if it is needed.

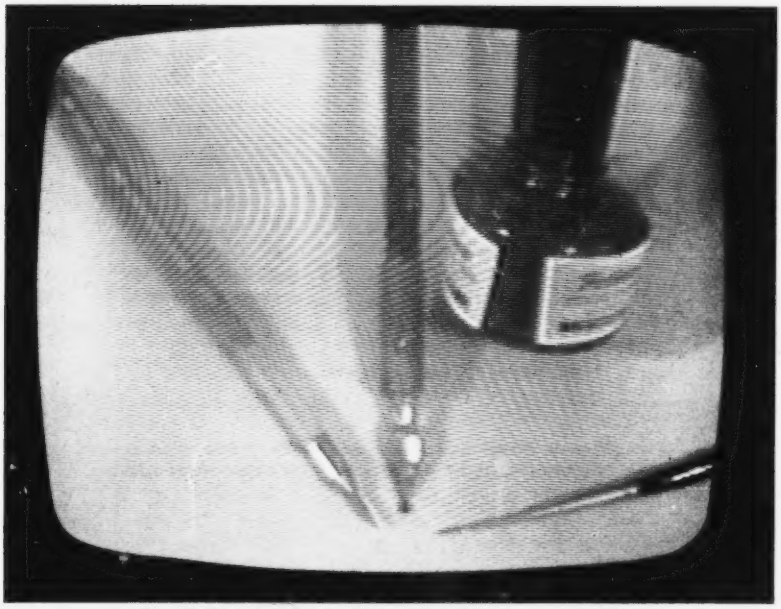


Fig. 16. Closest view possible with the regular camera lens.

One of the principal uses of the camera-receiver system is magnification of small objects, machine parts, chemical and physical experiments, microscopic life, ant colonies, and how-to-do-it operations such as typic or musical instrument playing.

The familiar inexpensive photographic close-up lenses may be attached to the camera lens or to an adapter to permit extremely close observations. Figure 15 shows close-up lens attachments on the television camera with an appropriate lens adapter. Close-up lenses may be purchased from photographic supply stores. They are available individually or in sets and attach to the camera lens individually or in combination.

The photographs in Figures 16, 17, and 18 show the relative advantage of each lens compared with normal cameral lens capability.

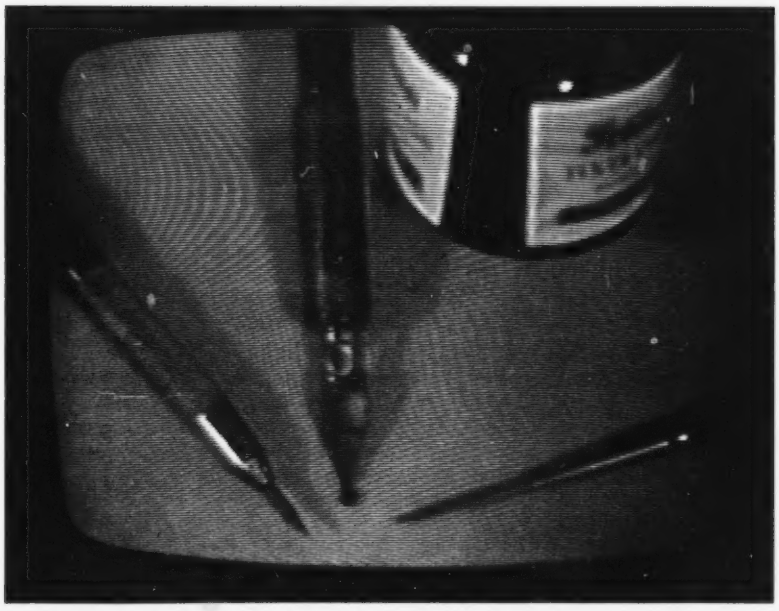


Fig. 17. A No. 1 lens attachment gives a slightly larger view.

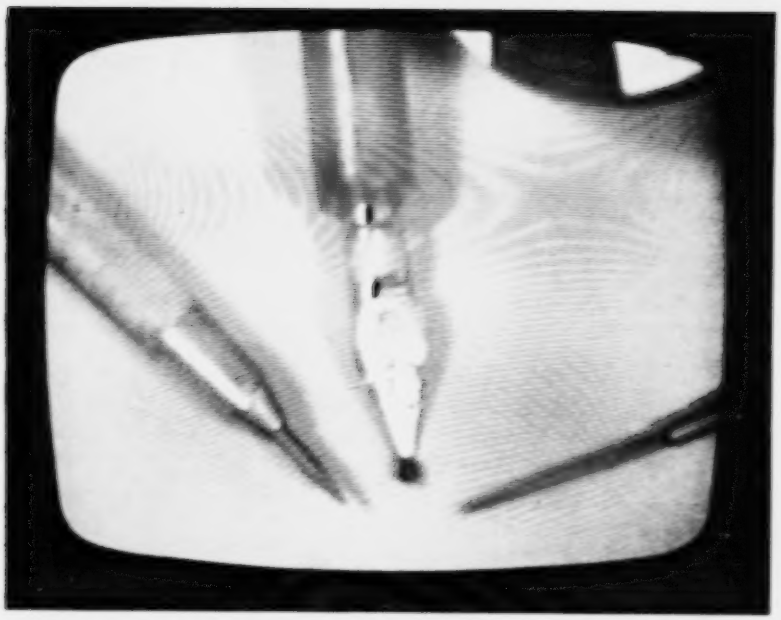


Fig. 18. A No. 3 lens attachment gives a much closer view. Still closer views could be achieved by using these lenses in combination.

A zoom lens will permit rapid near-far transition. Zoom lenses are expensive, but very convenient, although they will not serve for extreme close-up observation. Figure 19 shows the camera lens removed and the zoom lens attached in its place. The "hand crank" permits the cameraman to adjust near or far viewing immediately by hand.

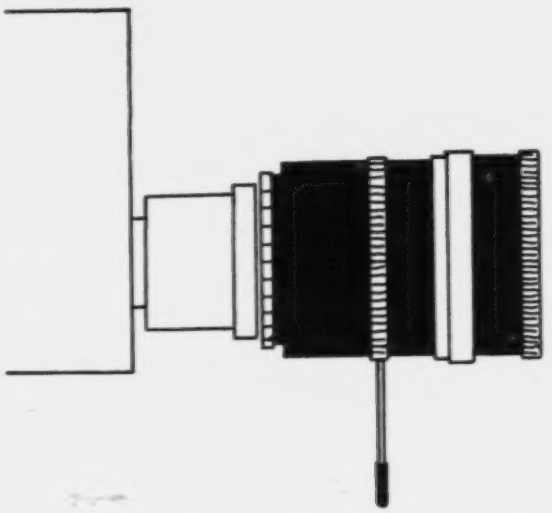
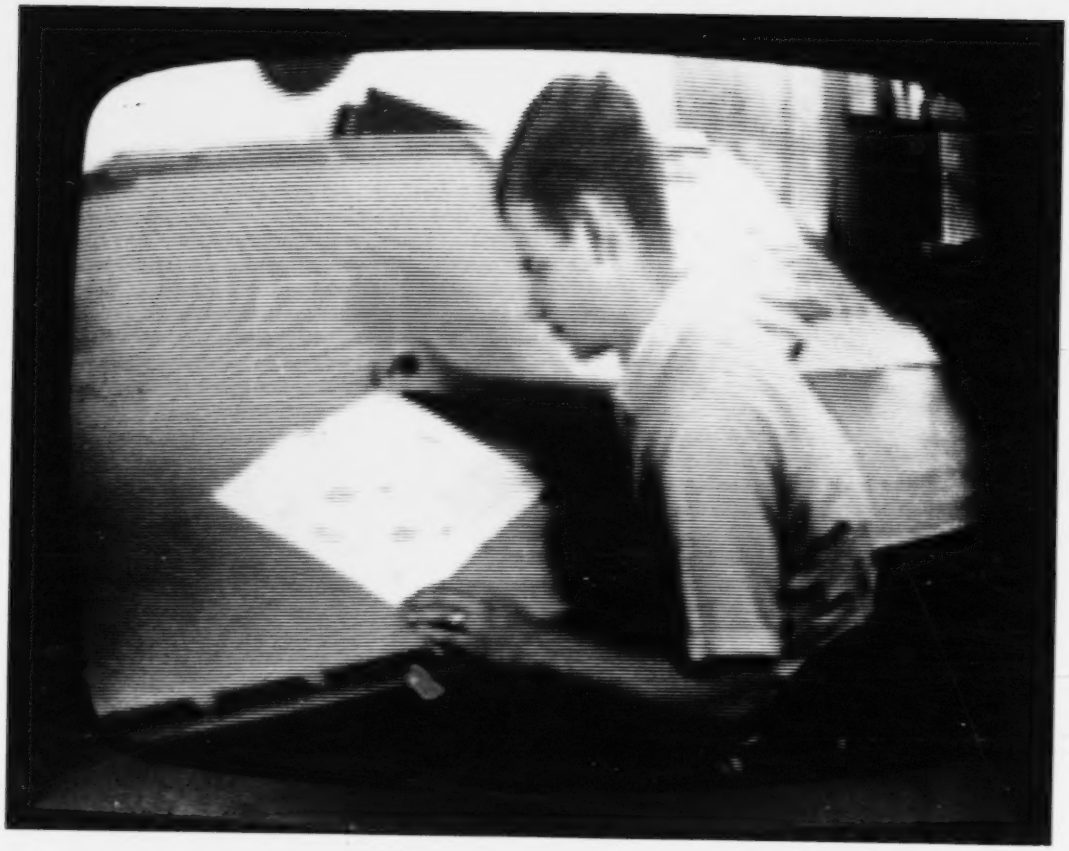
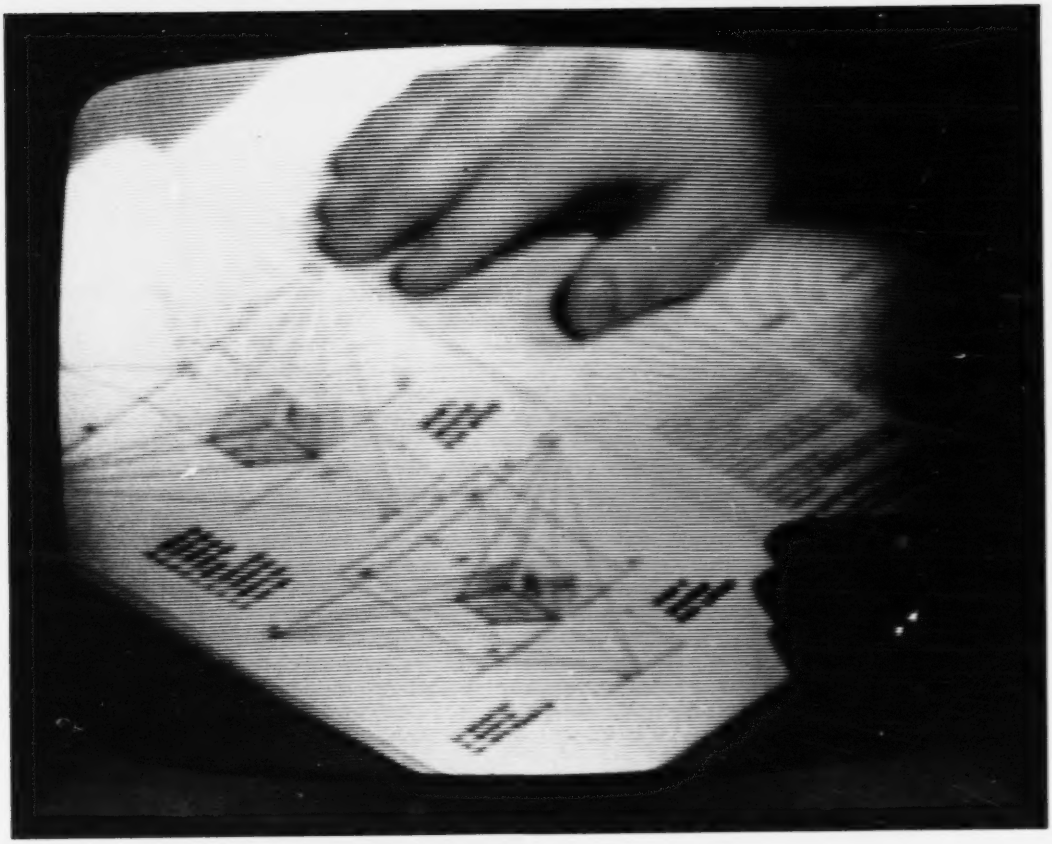


Figure 19. Zoom lens replaces the camera lens directly on to the lens mounting of the camera. A manual zoom handle or "hand crank" is shown.

The following photographs show the far and near capabilities of one zoom lens. Most television zoom lenses are usually 4 to 1 in range from far to near.

Other uses of the camera-receiver hookup are remote observation or monitoring of assembly lines, monitoring restricted facilities, showing surgical demonstrations, and many others. Telescopic lenses may be purchased for some of these observations.





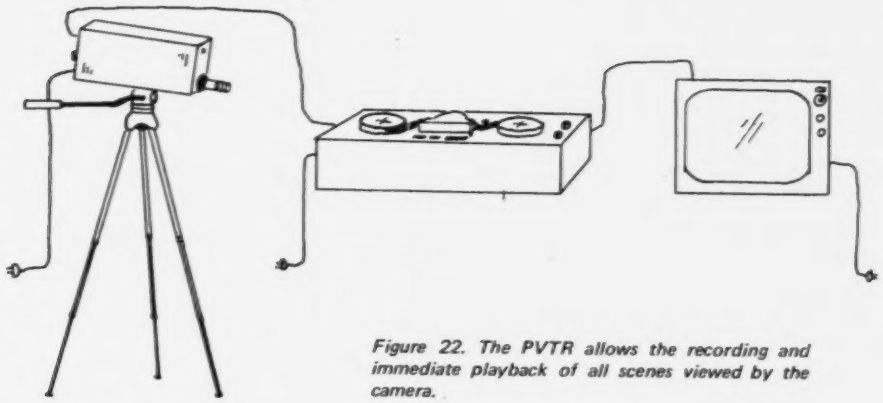


Figure 22. The PVTR allows the recording and immediate playback of all scenes viewed by the camera.

Adding The PVTR

The addition of a PVTR to the system permits anything seen by the camera to be recorded and played back immediately. This unique instrument vastly expands the scope and potential use of portable television equipment. The video tape recording lasts indefinitely if stored away from high temperatures and electrical or magnetic equipment. Figure 22 shows the PVTR added to the previous simple system.

You will note that both the camera and the receiver have cables going to the PVTR. The recorder also must have a source of power. Frequently provision is made for supplying power to the camera and receiver through the recorder so that only one power source is required.

Threading The PVTR

Threading the PVTR is relatively simple. A diagram usually accompanies the equipment and an instruction booklet gives further information. Threading patterns of several makes are shown in Figure 23. The equipment dealer will usually point out a few good techniques to use for best results. The threading path needs to be kept clean, and a fluid and cloth or brushes are usually included with the purchase. Some PVTR's have a built-in monitor, although most recorders will need to have an instructor's monitor added to the system. Some cameras have built-in remote control switches (usually RECORD and STOP) so that the teacher need not walk over to the PVTR switches to start and stop recordings.

Recording

The PVTR records in much the same manner as does the familiar audio recorder, except that the small recording head in the PVTR whirls rapidly in circular fashion (helical scan). The video tape is threaded in slanted fashion about the helical ring containing the recording head. Figure 24 is a drawing of a typical "slant track" recording.

When properly threaded the PVTR requires only one or two switches or buttons to be pushed in order to record. The monitor will faithfully reflect all images being recorded if it is connected for that purpose.

Video And Audio Meters

The audio meter on the PVTR is essentially the volume indicator. It is adjusted by the familiar volume control found on any sound device. The task is to set the control so that most variations in source volume fluctuation can be accomodated without getting loudness distortion on one hand or no sound at all on the other. Audio meters will indicate a normal fluctuation in sound. If the needle tends to favor one end or the other of the scale, adjustment is needed. A red band area of the scale is the distortion level (too loud).

The video meter gives a contrast reading. If the video level control is too low the picture will lack contrast and look gray or foggy. If it is too high there will be overexposure or "white out" on picture highlights much as you find on the receiver when there is too much contrast. There is a recommended PVTR video control setting given in the manufacturer's instruction booklet. Figures 25 and 26 show typical audio and video level meters.

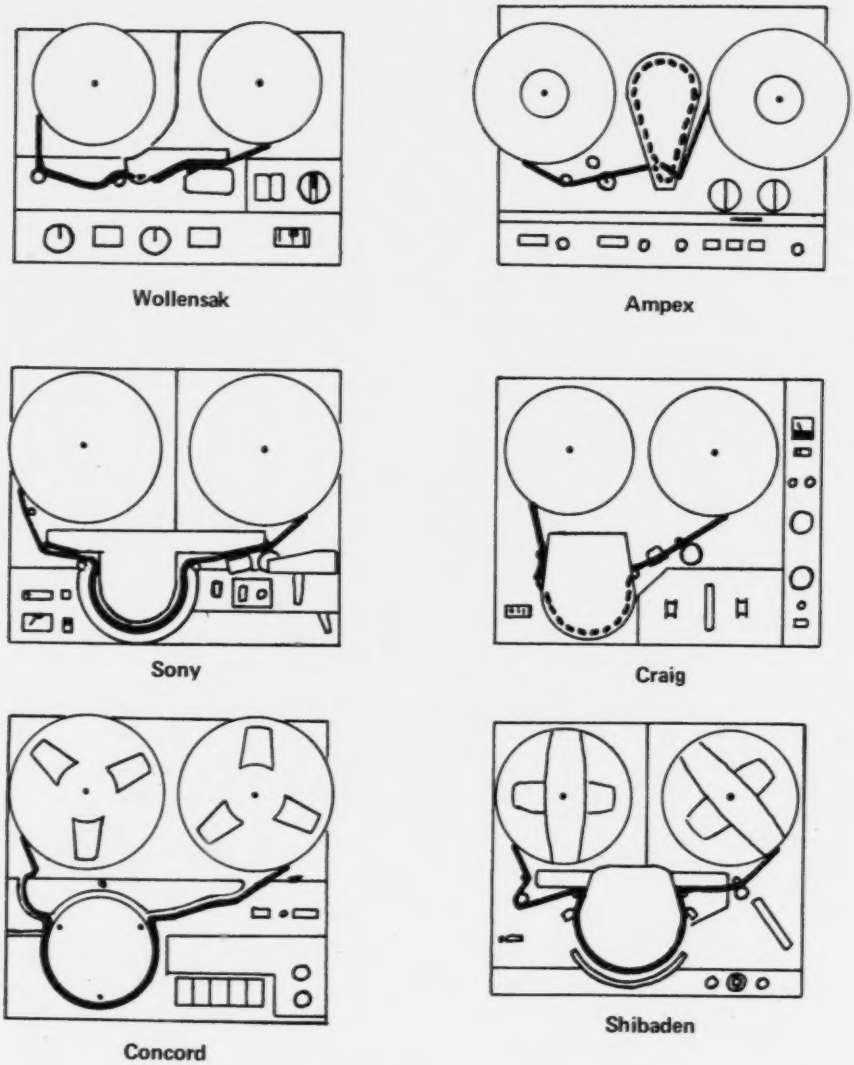


Fig. 23. Threading patterns of a few portable video tape recorders.

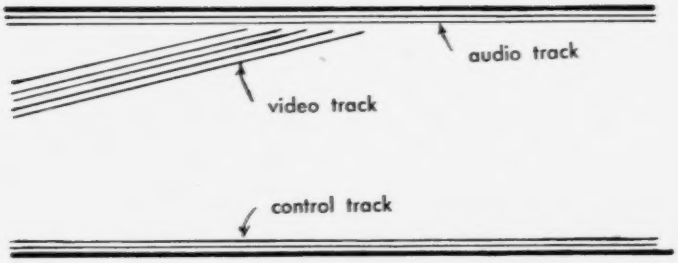


Figure 24. The slant track recording resulting from the helical scan is found on all portable recorders. Note that the sound track is a separate, but synchronous, recording.

Fig. 25. Ampex audio and video controls.

Fig. 26. SONY audio and video controls. The same meter serves both purposes if the switch on the right is in the desired direction.

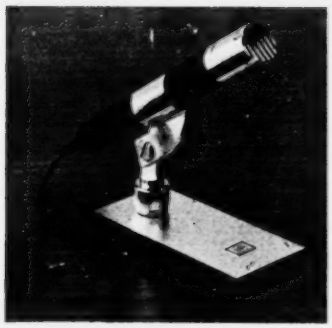
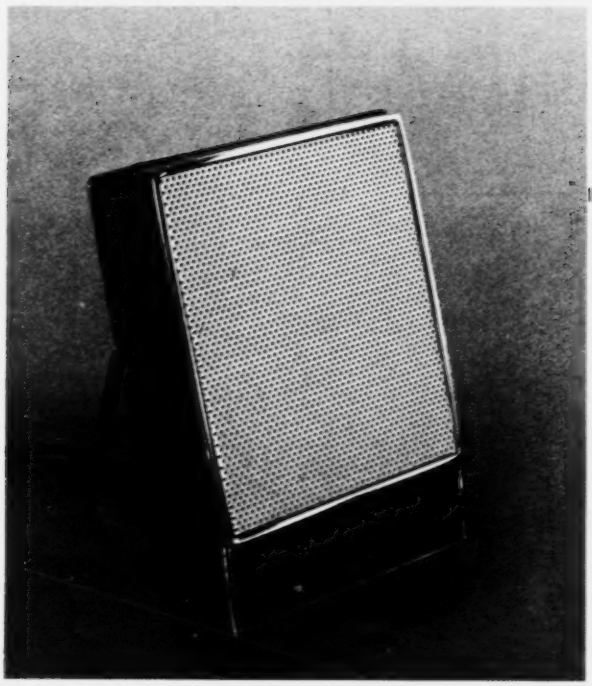
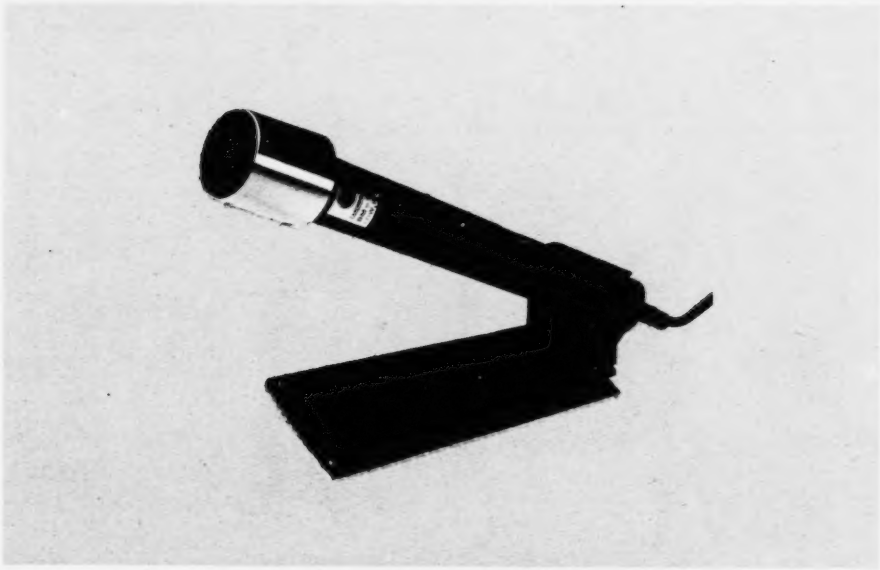


Fig. 27. Microphones usually included in PVTR systems.





A Word About Microphones

Most PVTR systems have microphones adequate for recording situations in the school. Figure 27 indicates the kind of small microphone that usually accompanies the system. For better recordings, microphones of known quality will have to be purchased separately. When recording situations require more than one microphone, a multiple-jack outlet may have to be added. A mixer may be necessary, as well. This audio layout involving several microphones and a mixer can get a little complex if you are not experienced with sound equipment, but your school district audiovisual specialist will be able to advise you.

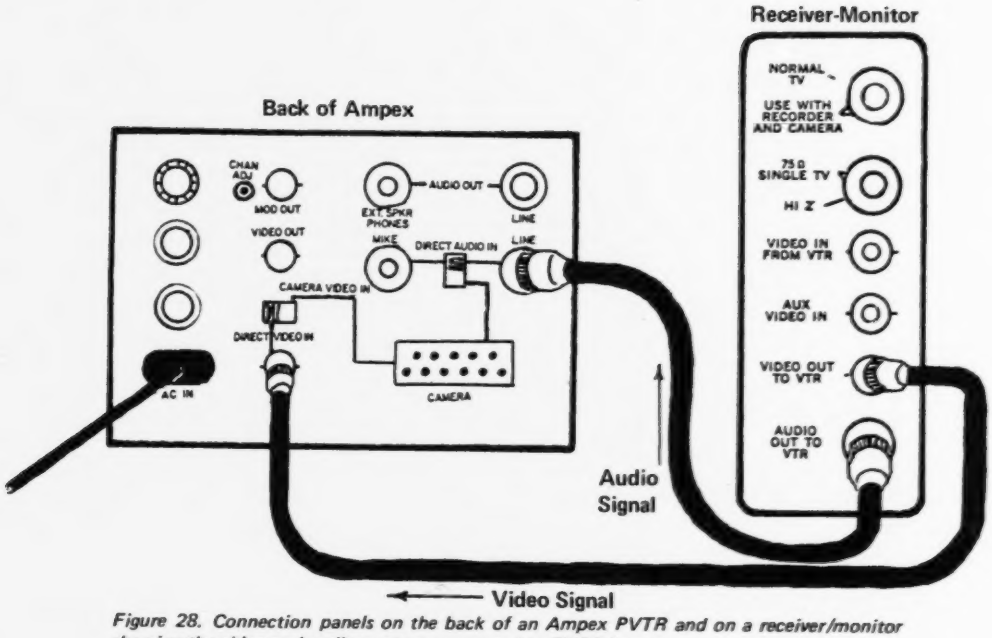


Figure 28. Connection panels on the back of an Ampex PVTR and on a receiver/monitor showing the video and audio outputs connected to PVTR inputs.

Recording Off-The-Air Broadcasts

Off-the-air recording of commercial television programs is another simple operation. Merely tune in the receiver/monitor to the desired channel and connect the receiver outputs to the PVTR video and audio inputs. Figure 28 shows the connection panel of a PVTR and of a receiver/monitor with the connection cables.

For PVTR's that have built-in monitors only a switch needs to be pushed in the right direction to accomplish off-the-air recording. Figure 29 shows this switch on a PVTR with built-in monitor.

A word of caution needs to be made here. Attention must be given to possible copyright violation. Usually approval will be given freely by local stations for locally produced programs. Advice will also be given on how to proceed in securing approval for nationally televised programs. The conditions asked for by local and national broadcasters is that no dissemination beyond the actual single classroom be done.

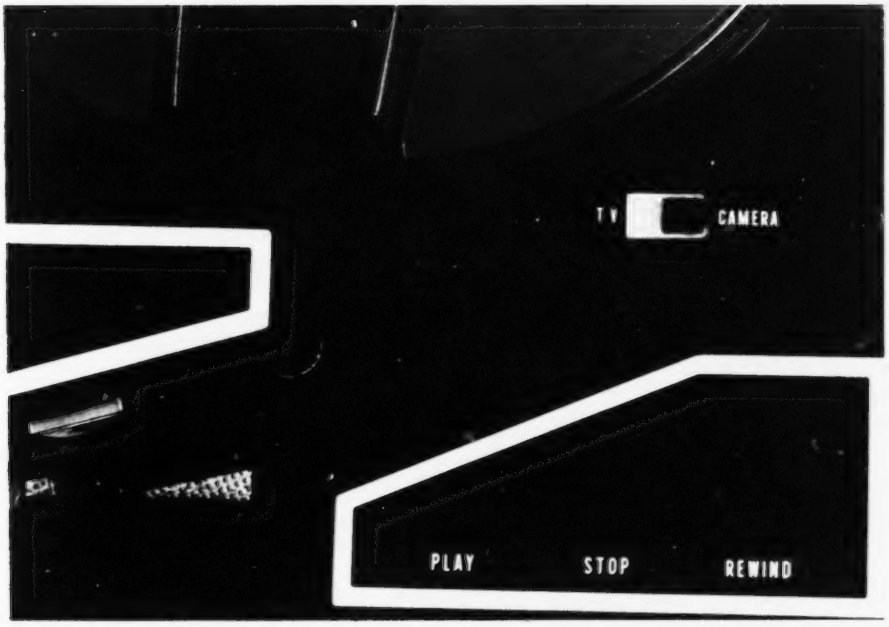


Fig. 29. The SONY uses a switch to change from camera recording to recording programs from the television receiver.

Adding Audio Later

Some PVTR's offer the opportunity to add a narration or commentary after the video recording has been made. This dubbing in of a narration eliminates whatever sound was made originally with the video recording. A live microphone narration or previously recorded audio tape recording may be used for dubbing on certain PVTR's. It must be remembered that PVTR videotape has only one sound track, and therefore sound cannot be added to sound as is found in commercial television. Check with your equipment dealer for information on dubbing sound.

Videotape

Manufacturers of PVTR equipment and their local sales personnel supply a fairly good videotape at going prices. A word of caution must be given about other sources of video tape, however. On occasion you will hear of very inexpensive tape and will feel tempted to purchase many more reels for the same price you pay for a few reels of good tape. Computer tape is one of these cheapies. The subsequent damage that occurs to the video and audio recording heads of the PVTR from the use of cheap tape will cure you for life. Cheap tapes are either too abrasive and wear down recording heads, or they are too soft and clog the recording heads. Furthermore, some cheap tapes have microscopic bits that flake off or irregularities in the tape coating consistency that cause "dropout" on the screen. The general effect of dropout is the appearance of horizontal white or dark lines or scratches on the receiver screen.

In writing specifications for purchase a good description to use would be "video tape shall be free from dropout, of video quality having still frame capabilities, with oxide qualities that prevent video head wear and head clogging." Other factors considered in passing judgment on video tapes are signal-to-noise ratio (graininess of picture) and the occurrence of physical or magnetic defects.

A reel of video tape should be given proper care. Even while storing the tape care must be taken to see that it is placed in a box, stored upright rather than flat, and placed in an area where temperature and humidity are moderate. The box should have hub supports for the reel.

Avoid using damaged tape on the PVTR. Tape that is stretched or wrinkled will not give good recordings. Splicing should also be avoided, but when necessary, follow the instruction manual closely.

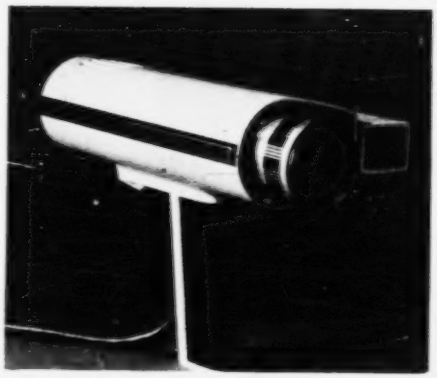
On the PVTR use caution in threading the video tape, checking to see that the tape path is properly followed. When playing or rewinding allow the reels to come to a stop without touching the reel with your hand. Wind and rewind all of the video tape before removing the reel from the PVTR. Lift the reel from the tape deck without squeezing the reel flanges.

General Tips on PVTR Purchase

There are a few things that should be noted while considering the purchase of a PVTR assembly. Bear in mind your situational needs as well as your budget. Although it is a waste of money to purchase equipment so low priced that it breaks down early, it is also unreasonable to look for equipment that is meant for studio use.

Television cameras and recorders used in portable systems do not give as good a picture as that found in commercial studio equipment. There is even quite a range of quality among portable systems as well. Choose the quality that suits your particular circumstances. You may not need a sharp picture resolution for the type of demonstration that uses large objects, for example. You may not need the quality found in one inch width tape and may prefer the half inch version.

A single manufacturer may offer you several levels of camera quality. Figure 30 illustrates a number of portable television cameras. If you desire a monitor built-in to or mounted on to the camera you must be willing to pay for the convenience. Figure 31 shows a selection of portable television cameras with "viewfinders" (monitors). They were designed primarily for school and industry closed circuit systems where low cost studio cameras are needed. The shoulder pack PVTR and hand carried camera are shown in Figure 32, 33, and 34. Just for interest, large commercial studio cameras are shown in Figure 35.



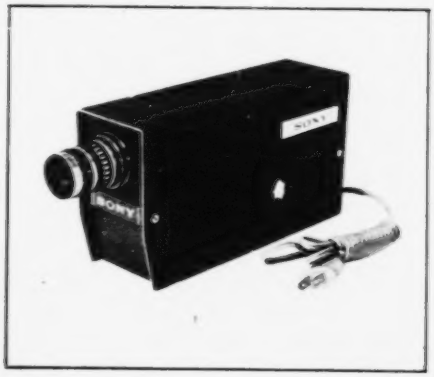
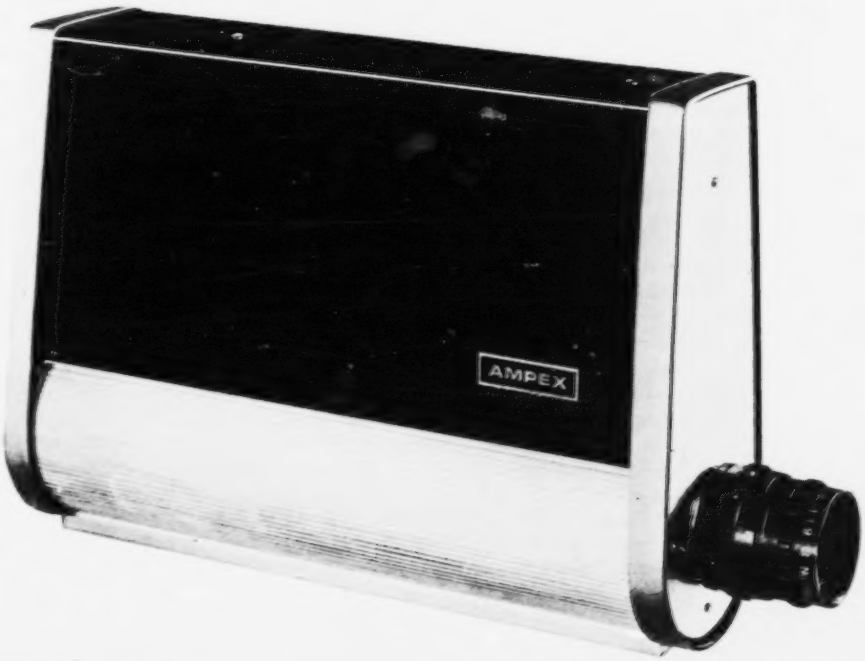


Fig. 30. A sample of the various portable television cameras currently on the market.



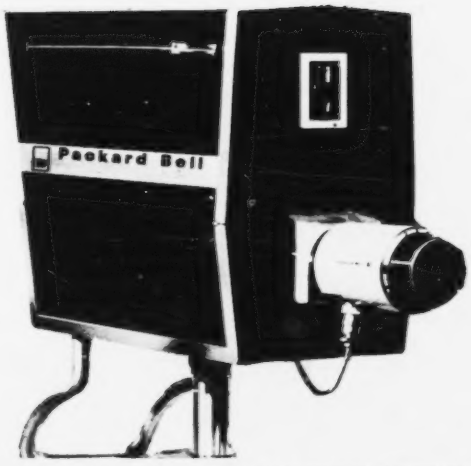


Fig. 31. Cameras with viewfinders (monitors).

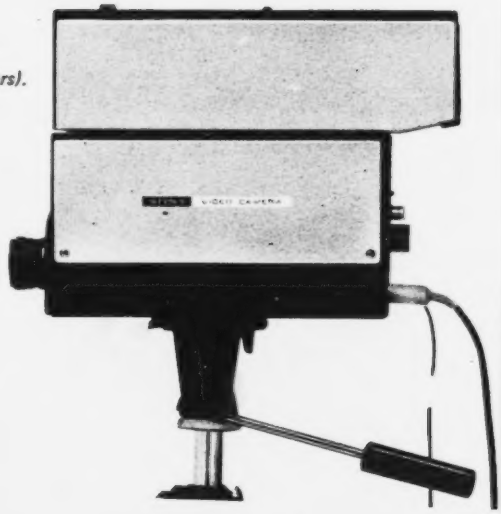


Fig. 32. The shoulder-pack half-inch PTVR with its hand held camera permits the ultimate in portability.

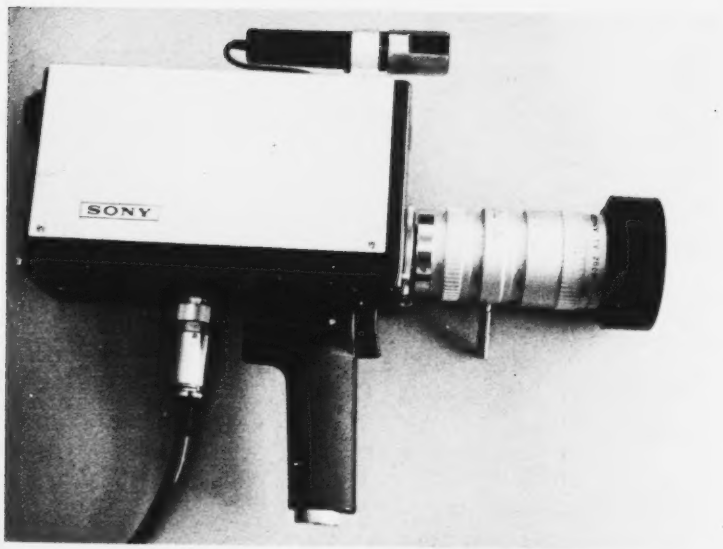


Fig. 33. The light weight shoulder-pack PVTR records up to twenty minutes on this small reel. Recordings must be played back on a standard PVTR of the same manufacture.

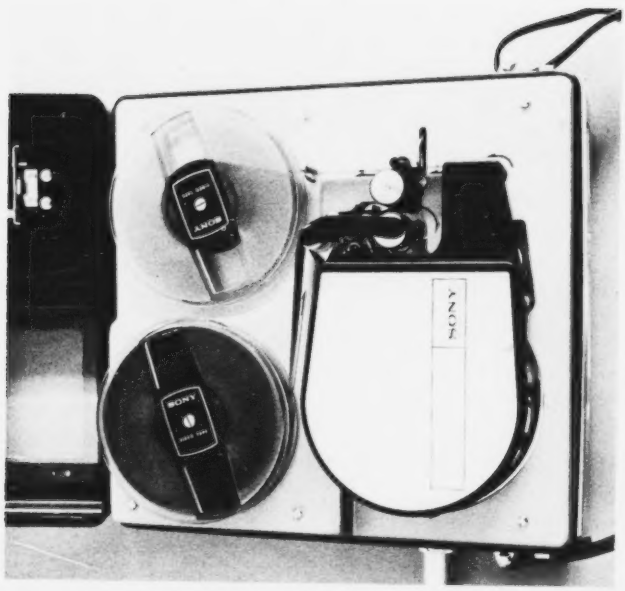
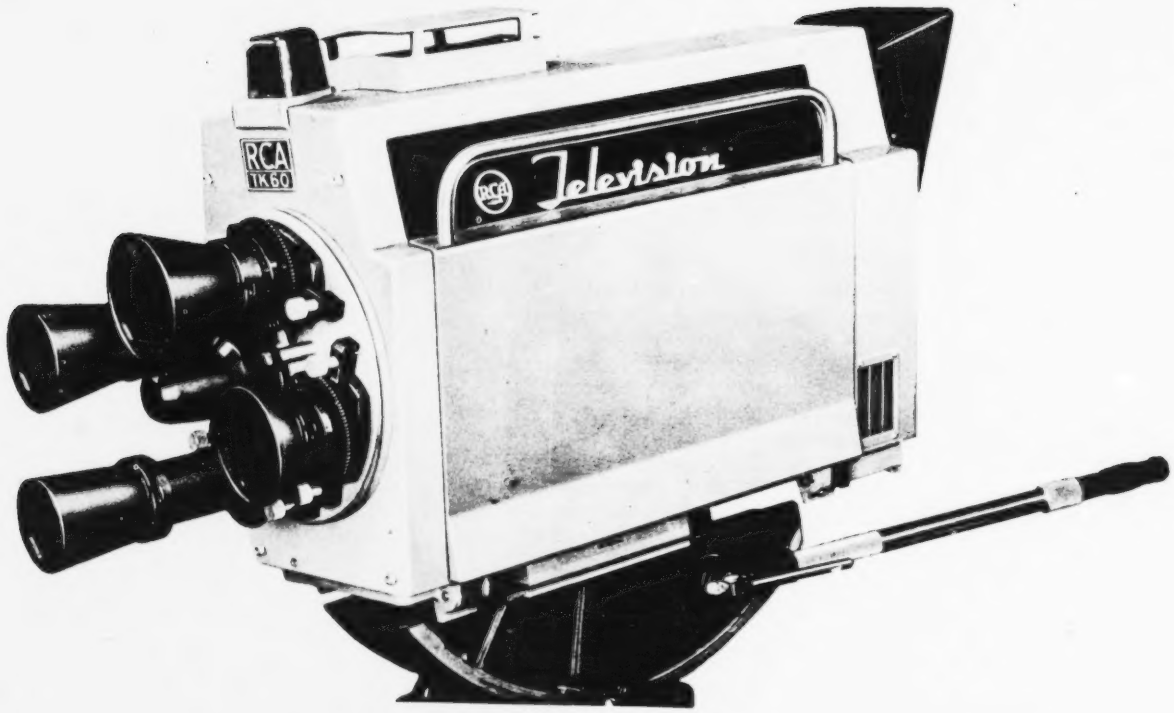


Fig. 34. The hand held camera operates with a trigger mechanism in the handle. A one inch monitor is built in to the camera as a viewfinder. The microphone sits above the camera.



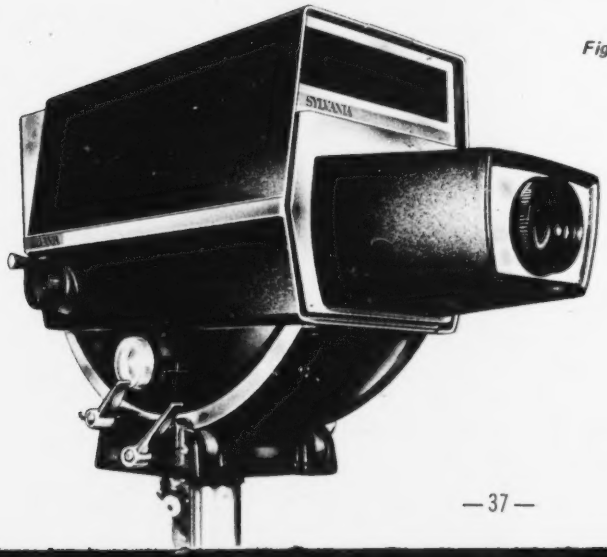


Fig. 35. Commercial television studio cameras.

Taking Care Of The PVTR

PVTR's should be transported from room to room on carts. Severe jolting will do more harm to a piece of television equipment than to any other audiovisual device because of the complexity and delicacy of the many parts. Cover the PVTR with the lid when not in use to keep down the amount of dust and moisture that may collect on every exposed surface.

The major concern in the care of the PVTR is the frequent cleaning of recording heads and the tape path. The manufacturer's manual will describe best methods and fluids for cleaning, but there are a few directions that can be used in caring for all PVTR's.

The whirling video recording head should be positioned where you can easily clean it. Use the video hand cleaner supplied by the dealer and cotton swabs. Gently work the soaked swab around the various edges of the little recording head. If it is exceptionally dirty, use an old clean toothbrush to work free the dirt from the head before using the swab and cleaner. Clean the metal drums around which the head rotates in the same manner. The video erase head, the control track head, the audio erase head, and the audio record head all need to be cleaned. Wherever the tape touches along the tape path should be given the same attention.

Rubber capstans and rubber rollers should be cleaned with isopropyl alcohol. This alcohol does not deteriorate the rubber.

EVALUATION AND SELECTION

PVTR equipment, in itself, has value for instruction only to the extent of defined objectives it fulfills. The major caution one must consider, when determining whether or not to purchase a PVTR, is to be sure it has a purpose in providing for suitable and effective instruction.

Low priced videotape recorders are literally flooding the market and creating considerable confusion for the consumer. Too often school personnel purchase instructional equipment with only cost as the criterion. If the cost of PVTR is the determining factor in the selection, an awareness of its strengths and capabilities for instruction will be required. Low cost PVTR equipment was not designed for professional television production and transmission.

Criteria for Selection

Characteristics of PVTR equipment must be determined in relation to the instructional uses planned for the equipment. The type of machine selection may be determined by such program objectives as portability or infrequent transport needs. Features for selection of a PVTR include:

Portability – Will the machine need to be moved frequently? Transporting equipment may require auxillary facilities such as a rolling stand, hand truck, or some type of conveyance.

Distribution Requirements – Will the PVTR be used as part of a closed-circuit (CCTV) television image distribution system? If the equipment is employed in a CCTV system to feed several receivers in classroom locations throughout the school, requirements for equipment specifications will be different from those necessary for a PVTR-Receiver combination in single classroom.

Reproduction Quality – PVTR equipment picture quality varies from manufacturer to manufacturer and from model to model.

Maintenance – Instruction must be available for simple maintenance procedures to keep the PVTR operational. Major repair work must be available without extensive delay and inconvenience to the instructional program.

Production characteristics – Instructional objectives must incorporate the need (if necessary) for capability in producing color, stop motion, slow motion, fast forward, fast rewind (for instant replay), resolution (picture quality), video editing capability, ease of operation (PVTR and camera equipment), and audio editing capability.

Serviceability – Equipment maintenance is a major deterrent to effective use and acceptability. The decision to purchase a particular model must include an evaluation of the servicing capability of the distributor and manufacturer. Adequate instruction should be provided for less complex maintenance and adjustment procedures.

Instruction – Sufficient time and effort for instruction on equipment operation is necessary. This should be provided by the manufacturer or his representative.

Compatibility – Tapes recorded on one machine may not be played on another recorder. Videotape is not a standard product as is audio tape or film media. A recorder must be selected which will be compatible with other units subsequently purchased. It seems feasible that demonstrations be required to illustrate interchangeability between like models from like manufacturers of videotape recorders. Standardization is not likely in the near future. Therefore, planning must incorporate a model and manufacture which will provide compatible record-playback which will include possible future developments. Different sized tapes are not interchangeable. Half inch, one inch, and two inch tapes are designed for specific models.

Dubbing – The process of making copies of recorded materials from the original adds another dimension to the flexibility of PVTR's. Quality of the transferred image varies from model to model. Picture quality is reduced with each successive dub that is made.

Too often disappointment results from experiences in using equipment. To avoid disappointment, it is necessary to select a machine which is based on needs. Sales personnel cannot be expected to determine the degree of effectiveness and satisfaction educators will obtain from a certain PVTR. In order to meet the rigorous standards of utilization in a school situation, a request should be made of the distributor to allow an extensive test of the equipment within the environment of its ultimate use. Several hours of actual use will be necessary to get a true evaluative demonstration of the equipment. PVTR equipment is sensitive and often unstable necessitating an extensive evaluation and a field test prior to purchasing decisions. Testing is absolutely necessary when considering the purchase of color equipment.

A further caution in transporting the PVTR equipment between locations is necessary because of the sensitivity of the components to rough handling. PVTR equipment must be handled carefully to avoid severe jars which may cause maladjustments resulting in disappointments due to malfunctions.

A checklist for individuals considering the purchase of PVTR equipment is included in the appendix of this publication.

See: Directory of Video Tape Recorders by Robert Angus in Audiovisual Instruction, V12, No. 9, (Nov. 1967), pp. 953-958.

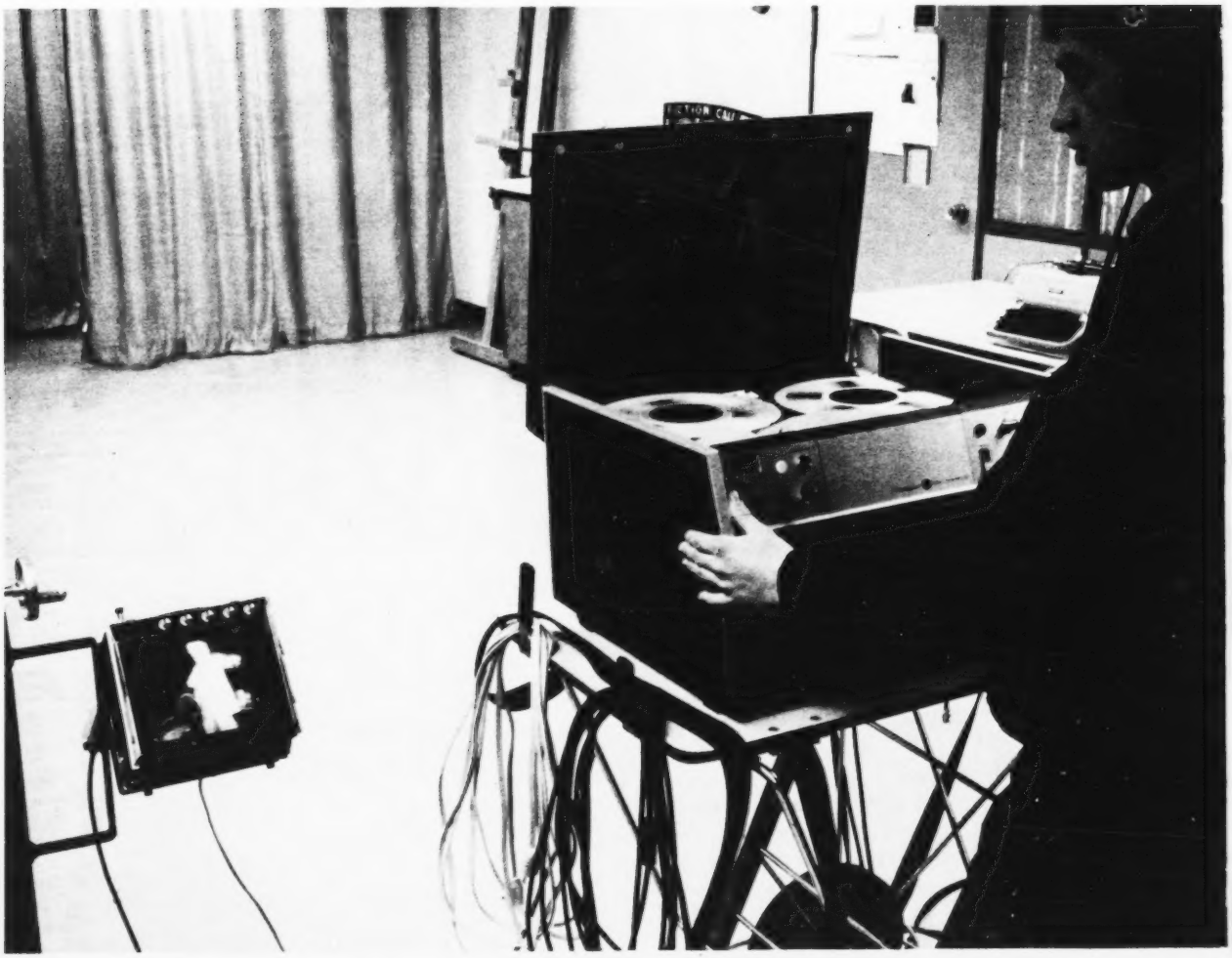
FUTURE POSSIBILITIES

Integrated Instruction With PVTR

Portable videotape recorders offer the teachers a promising instructional aid. Portability and instant replay provide students and teachers the flexibility in designing instructional experiences for immediate use which are practically non-existent in most other media.

The ease of operation also provides the teacher and student the first comparatively inexpensive production capability of simultaneous recording of audio and video images.

With the new video tape technology, experiences in planning, writing and producing creative works expands the curricular offerings related to all subject disciplines. Writing experiences may be meaningfully associated with science, history, math or any other subject area. Research skills are easily integrated in planning for the student television production which



will also require graphic arts projects. Planning for the production of the television experience will assist the teacher in defining behavioral objectives in meaningful and measureable terms based on the variety of activities appropriate to student achievement level and skills expectations.

As a "producer" of your instructional experiences, the major strength to be acquired is the increased knowledge and ability to: specify learning objectives, become a subject matter specialist, know how to design relevant curriculum for your students and, evaluate your product in terms of student behavior expected from the experience. These enriched teaching capabilities provide a teacher with definitive data relative to student learning which may be reflected in revised teaching strategies and learning sequences throughout the school term. The procedure of producing relevant learning experiences, therefore, is putting theory into practice.

The PVTR could conceivably change a considerable portion of the teaching methodology. The promise of increasing developments in miniaturization will allow for less expensive models with more capability and improved quality of the audio and video signals. The ease of operation and handling smaller units promise to increase the demand for PVTR equipment in the instructional process.

PVTR Record and Playback Capability

One of the major promises of PVTR's will be the recording and playback of materials, both black and white and color, not available within the scheduled class period. Copies of materials may be acquired from educational and commercial broadcast facilities. Within certain copyright restrictions, the teachers will have available a great source of historical, dramatic, and documentary material which may be presented to his class at a conveniently scheduled period. The ease of making recordings from a regular television receiver at home, school, or office for replay the following day extends the teacher's resources by an order of magnitude not available in the past. The materials will be used while it is current.

Concurrently, teachers and administrators will necessarily need to determine to what extent they wish to retain certain materials for replay at a later date. Storage, cataloging, and distribution of recorded materials will create new needs for space and new methods for retrieving the materials previously recorded. Efforts toward implementing a program of utilization based on convenient access will be enhanced by the continued research and development of less expensive equipment for playback.

PVTR's as Central Distribution Systems

A promising development which increases convenience of pre-recorded material is the central distribution systems which are appearing in schools. These systems utilize dial-access techniques similar to a punch button or dial system of telephones. A student or teacher may dial-up a program from a central storage display area (library) and view the material in a study carrel located in a library, classroom, or other study area. The pre-recorded material may be programmed for individual or group viewing consistant with the needs and objectives of a particular lesson. Dial-up systems will require a mass of material to satisfy the diverse needs of the individual.

A promise of PVTR's is the capability of teachers and students for planning and producing lessons for use through the dial-up system. A caution in the "home-produced" television lesson must reflect the ever present super-critical viewer who evaluates the technical quality of a teacher-student production. Two important factors must be kept in mind:

1) *This type production is satisfying a local need and is not a commercial or studio type program.*
2) *The lesson must be planned to provide learning experiences based on needs of the student and the objectives of the instructional sequence.*

Educators must be cognizant of the total experience in planning and developing lessons for the PVTR. The research and development necessary prior to taping something to use and reuse is an integral part of the student's instruction.

PVTR Tape Exchange

Libraries of tapes will start to formulate in a school or district. Exchanges may be arranged between teachers, schools and districts. It is also possible to develop international videotape exchanges to gain the instructional-cultural perspective of other societies. Exchanges between schools of different countries with audiotape have existed for many years. A library of these types of video tapes would provide a "first hand" authentic study of other cultures.

Whatever the system for storage and retrieval, the exchange of tapes among teachers in different classrooms will grow with increased experience and attention to relevant planning for recording.

Cost vs. Quality of PVTR's

Attendant problems when considering tape exchanges among teachers, schools, and districts may be a source of frustration. These frustrations arise from the cost vs. quality, dilemma. In planning for the use of PVTR's the cost and quality factors are important. In either case quality is not the same, in degree, as the quality of studio type productions. If one must be cognizant of the cost factor, half-inch PVTR's are available at relatively low cost. As you require additional production capability in a machine, costs increase with varying auxillary features. However, the half-inch PVTR will give sufficient service for use in the classroom. The half-inch tape machines being sold are unique. The tapes can only be played on the machine on which they were recorded. Although different manufacturers have designed a half-inch tape, tapes cannot be interchanged. Standardization does not exist in the PVTR industry as it does in the 16mm motion picture film industry. Even though there is a lack of ability to exchange tapes for different model machines, when one must consider budget, the half-inch model PVTR would be considered useful for many instructional experiences.

The other type machine popular at the school-classroom level is the one-inch PVTR. Many manufacturers have produced a larger machine at greater cost than the half-inch machines. The one inch models, however, produce a better quality recording than the half-inch machines. Manufacturers have not standardized to the point that tapes recorded on one model may be played back on a different manufacturer's model. One company, however, advertises complete interchangeability on its various models of one inch PVTR's. Should purchase of PVTR's be considered and several needed in a district or area, it should be wise to consider the compatibility of the equipment so that exchanges of recorded materials will be possible.

As in the motion picture industry, standardization may be adopted sometime in the near future. Until standards exist, the equipment being considered for purchase will usually be that equipment that will best fit specified needs, potential needs, and future plans for the use of PVTR equipment in a school. Use of the PVTR equipment as central (closed circuit TV) system for sending taped material via cable to a remote

classroom is limited. The larger one-inch models are more capable of this function than half-inch models. Specifications must be understood and discussed with suppliers.

Disappointments in the use of PVTR's will be avoided by having a concise plan for their use, specifying needs, understanding each model's capability, determining compatibility needs, and using the equipment for what it was designed – and no more.

Tape Duplication

With the increased use of the PVTR's in many schools, the exchange of tapes, and the access-retrieval needs for pre-recorded materials, it will be necessary to consider methods of duplicating tapes. Master tapes need protection from accidental damage or erasure. Maintaining a library of masters is expensive, however a system may be developed within a district where masters are stored and cataloged. A dub (duplicate of the recording) may be made for use in neighboring schools. Should a school district consider this service, cost becomes a major factor. Personnel, additional equipment and tape stock will be necessary to maintain the "master" library.

Because local libraries do become costly, school district personnel may want to investigate one of several commercial dubbing services. Since the advent of PVTR usage has grown so rapidly, commercial organization do provide dubbing services. Your local instructional materials center or instructional television personnel may help you with information relating to cost, location, and scheduling of duplicating services.

PVTR EVALUATION CHECKLIST

The individual checklist items below will serve teachers and technicians as guides to intelligent purchasing. Some of the terms may appear a little technical, but they are necessary. Equipment dealers are quite helpful when they know you are actively seeking bids or estimates. Much of this information is also available from manufacturer specification sheets.

New equipment selected should be tested in the shop before payment is made. Television equipment is subject to many more malfunctions than is projector equipment, because the former is far more complex.

Camera	Desirable	Satisfactory	Undesirable
Camera has RF			
Viewfinder			
Size			
Weight			
Lines of resolution			
Scan system			
Lens			
Lens mount			
Lens range			
Connecting cables			
Remote control			
Tripod			
Color			
PVTR			
Operating skill needed			
Size			
Weight			
Number of heads			
Life of heads			
Still frame			
Slow motion			
Tape width			

(continued next page)

	Desirable	Satisfactory	Undesirable
Tape speed			
Reel size			
Reel cost			
Recording time per reel			
Percent loss of scan lines on playback			
Amplifier power			
Modulated RF output (in mv)			
Distortion on playback			
Off-the-air recording ease			
Second sound track			
Fast forward speed			
Rewind speed			
Volume indicator & control			
Video indicator & control			
Color			
Operation manual			

Other Considerations

Is a classroom receiver/monitor included in the system?

How many receiver/monitors can the PVTR support?

Is there a service contract locally available?

What is the reputation of the servicing agency?

Which accessories are included with the system beyond the basic components at no extra cost?

Is the microphone satisfactory?

Guarantee coverage is given to what specific items and for what time period?

GLOSSARY

AMPLIFIER: Strengthens a signal to the point where it can be heard over an audio speaker or be reproduced as a television picture.

ANTENNA: A device for receiving and then conducting radio and/or television signals that have been transmitted through space.

AUDIO: The sound portion of a television signal.

AUDIO INPUT: A jack that provides for a microphone plug-in. Provision is also made for other audio signals coming from audio tape recorders, video tapes, and other electronic sources of sound. The latter are usually plugged in to the audio "line" input.

AUDIO-VIDEO MIXER: (see also MODULATOR) A device that combines the separate audio and video signals from microphone and camera high frequency signal for transmission to the receiving equipment where the signals are again separated and directed to the speaker and television screen.

BAND: (see also VHF and UHF) A portion of the frequencies in the broadcast spectrum allocated by the FCC for specific purposes.

BRIGHTNESS: The brilliance of the television picture.

BROADCAST: A system of transmitting radio and television signals "over the air" by receiving antenna. Any receiver with appropriate antenna and tuner may receive the signal in the broadcast area.

BURNED-IN IMAGE: An image which persists in a fixed position after the camera has been turned to a different scene.

CAMERA CHAIN: One or more cameras and other devices needed to transmit a television picture.

CANNED PROGRAMS: Television programs that have been taped for later dissemination.

CHANNEL: A specific wave length or band of frequencies for transmission.

CLOSED CIRCUIT: A system of transmitting television signals to receiving equipment directly by coaxial cable or microwave transmission.

CLOSE-UP SHOT: Very narrow angle picture giving full view to a small area.

COAXIAL CABLE: A specially constructed cable designed to carry closed circuit telephone and television signals. Use of coaxial cables permits system privacy. It has low loss of power at higher video frequency levels.

COMPATIBILITY: The capability of using a piece of television equipment from one manufacturer with that of another manufacturer.

CONTRAST: The brightness relationships between the various light and dark elements of a picture.

CONTROL CONSOLE: An assembly of television studio equipment which contains the devices necessary to operate and adjust the various components of a television installation.

DISTRIBUTION SYSTEM: An arrangement by which a television signal is sent to desired locations.

DROPOUT: The loss of portions of a tape recorded signal due to tiny pieces of emulsion breaking loose from the videotape. Horizontal lines on the television picture result from dropout.

DUBBING: Inserting new portions of video or audio recording on a videotape in the place of original portions.

FCC: Federal Communications Commission. The official governmental regulatory agency for all broadcasting and microwave installations.

FILM CHAIN: A combination of various types of projectors and television cameras to arrange the use of projected materials in a television studio.

FILM MEDIA: Transparent media such as motion pictures, slides, and transparencies.

GHOST IMAGE: An unwanted secondary image of the transmitted picture appearing on the screen caused by a reflection or several reflections of the transmitted signal. Aircraft frequently cause reflections that produce ghost images.

HALO EFFECT: A dark area surrounding an intensely bright object on the screen. Lights or reflections will result in halo effect.

HELICAL SCAN: The type of recording made on videotape by portable video tape recorders. It is accomplished by having the recording head rotate in circular (helical) fashion while running the tape past it at a slant. The result is a "slant track" recording.

HORIZONTAL BAR INTERFERENCE: Alternate dark and light bars which extend over the length of a television picture giving a venetian blind effect. They are caused by an interfering electronic frequency.

INSTANT REPLAY: Rapidly rewinding and playing back some scenes just recorded on videotape.

KINESCOPE: A cathode-ray tube having a flourescent screen used to reproduce the television picture in the receiver or monitor.

KINESCOPE RECORDING: A 16mm film made by a motion picture camera designed to photograph a television program directly from the front of a television receiver.

LAVALIER: A small microphone worn around the neck.

MICROWAVE: A closed circuit radio and television signal transmission that follows a "line-of-sight" path between one location and another. The system involves special transmitting and receiving units and antennas.

MODULATOR: A device that combines the video signal from a TV camera and the audio signal from a microphone or similar source and impresses them on a carrier signal for transmission on a closed circuit system.

MONITOR: Any receiver used by a cameraman or teacher to observe the picture being received by the viewer. In television studios a monitor is a high quality television receiver used in video transmission. Video monitors must be used with video cameras, and can not be tuned to channels, and normally have no provision for sound reception. In portable situations receivers are used in monitors.

MONOCHROME: The image produced on a black-and-white television system.

NOISE: Electrical interference in audio and video transmission producing a "salt-and-pepper" effect on the television picture. Greater interference produced a

"snow" effect. The noise ratio is more pronounced near the fringes of a broadcast reception area.

OPEN CIRCUIT: Television signals (programs) that are broadcasted to a community, such as commercial television, and received by antennas.

PAN: To follow action to the right and left with the camera; to move the camera across a screen.

PLAYBACK: The replaying of a television recording.

RF (Radio Frequency): A system of high frequency transmission using bandwidths of the radio spectrum to carry both audio and video signals. Several television programs can be transmitted at the same time over a single coaxial cable for considerable distance. There is lower picture quality when compared with video because of RF bandwidth restrictions.

REAR PROJECTION: Material projected on to the rear of a translucent screen.

RECEIVER: Any television set designed for home or school reception of picture and sound. In portable situations a receiver serves as a monitor also.

RESOLUTION: The ability of a television system to reproduce the fine, sharp detail of a picture in dark and light lines that run across the width of a television screen. Closed circuit systems are capable of 600 lines or more of resolution. Standards resolution is 525 lines.

ROLL: An upward or downward movement of the picture on the screen of a receiver.

SCANNING: The process of deflecting the electron beam in a camera so that it moves at high speed in a sequence of rows or lines changing light and shadows of a scene into electrical impulses. These impulses, when conveyed to a monitor or receiver, are scanned across the flourescent screen in the picture tube to form the image.

SOFTWARE: A general term referring to the non-equipment materials used in preparing programs: Film, pictures, scripts, recordings, and even the programs themselves.

SOLID STATE: Equipment that contains transistors rather than tubes as part of its electronic circuitry.

TELEPHOTO LENS: Lens of very narrow angle used to provide large size images at extreme distances.

TEST PATTERN: A design made for correct focusing and tuning of the television image.

TILTING: A vertical movement of the camera.

UHF: An abbreviation for ultra high frequencies. These frequencies range from 300 to 3000 megacycles, encompassing channels 14 through 83.

VHF: An abbreviation for very high frequencies. These frequencies range from 30 to 300 megacycles, encompassing channels 1 through 13.

VIDEO: The electrical counterpart of the picture portion of a television program.

VIDEO INPUT: A jack that provides for video picture signal input from either a television camera, a PVTR, or a receiver.

VIDEO SYSTEM: A system in which only video signals are transmitted and received. One video signal only may be carried by coaxial cable at one time. Pictures of better quality than those in RF systems may be achieved, but the lower frequencies at which the picture is transmitted results in rapid deterioration of the signal distributed. Frequent amplification along the way is necessary if distributed over extended distances.

VIDICON: A television tube used in most portable television cameras of much smaller physical size than the larger studio image orthicon. The vidicon tube requires more light for comparable operation but is less expensive. The vidicon tube lasts much longer than the image orthicon.

VIEWFINDER: A small camera-mounted monitor used by the cameraman for framing and focusing.

ZOOM LENS: A special camera lens whose focal length is quickly adjustable from close up to distant scenes and is always in focus on an object or scene within this wide range.

CUE GUIDE

1. **Stand by –**
   Floor director's arm is raised up until execution of the cue. Standby is warning for cue and all should maintain silence.

2. **Cue –**
   Floor director brings arm down from "stand-by" and points at talent – imitates "on-camera" action.

3. **Speed-up –**
   F.D. moves forearm in circular motion to step-up the pace.

4. **Slowdown –**
   Moves hands away from each other in stretching motion – to signal a slackening in the pace of delivery.

5. **Eye Contact –**
   F.D. points finger at taking lens of camera to remind talent to look into camera.

6. **Cut –**
   F.D. draws hand, palm down, across throat to signal a halt to all activity.

7. **Camera Cue –**
   F.D. swings arm in wide arc and points at the camera which is "on the air" to help talent maintain eye contact.

8. **Brighten-up –**
   Places hands under chin to signal talent to brighten up facial expressions talent is dead pan – needs sparkle.

CAMERA GUIDE

Symbol	Video symbols
X L S	Extreme long shot
L S	Long shot
M S	Medium shot
M C U	Medium Close-up
C U	Close-up
T C U	Tight close-up
X C U	Extreme Close-up
2 shot	Two-shot
3 shot	Three-shot
0 Shoulder	Over-the-Shoulder

Since audio cues are more detailed and technically complex a simplified system may be devised to represent music, announcer's voice, talent's voice and other sound effects.

BIBLIOGRAPHY

Gay-Lord, James H., "INSTRUCTIONAL TELEVISION" Virginia State Department of Education. 1967.

Spear, James, "CREATING VISUALS FOR TV," Division of Educational Technology, NEA, Washington, D.C. 1962.

Vasche, Gertrude A., "UTILIZING TELEVISION IN THE CLASSROOM" Pacific Coast Publishers, Menlo Park, California. 1966.

"Extending Video Tape Life Through Proper Handling and Storage." A chart available from Ampex Corporation, 401 Broadway, Redwood City, California 94063.

"The Tape Recorder in the Elementary Classroom: A Handbook of Tested Uses." 3M Company, St. Paul, Minnesota. 1955.

"Instructional Graphics For Television – A Kit." Educational Media Laboratories, Austin Texas. 1968.
(The kit contains a multi-media package of ideas and suggestions for the creation of graphics for TV)